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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/726,357
Filing Date: December 03, 2003
Appellant(s): SKOOG ET AL.

MAILED

JUL 25 2006

GROUP 1700

K. Scott O'Brian
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10/24/2005 appealing from the Office action mailed 3/30/2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

Ground 8) Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. as applied to claim 1 above, and further in view of Skoog et al.

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. The examiner has withdrawn the provisional obvious double patenting rejection to claims 1-5 over claims 2, 6, 7, 9, and 10 of copending Application No. 10726361 in view of the terminal disclaimer filed 6/9/2005.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

US Patent Number 6,720,034	Skoog et al.
US Patent Number 6,210,791	Skoog et al.
US Patent Number 6,455,167	Rigney et al.
US Patent Number 5,545,437	Nagaraj et al.
US Patent Number 4,877,647	Klabunde
US Patent Number 5,407,705	Vakil
US Patent Number 5,922,403	Tecle
US Patent Number 4,676,994	Demaray
JP 60081892 A	AKECHI HOUSHIYUN

Eppler, Richard A. "Ceramic Coatings" Engineered Materials Handbook. Volume 4. Ceramics and Glasses. ASM International. 1991. Pages 953-956.

Kirk-Othmer. Encyclopedia of Chemical Technology. Fourth Edition. Volume 22. Page 670-690.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-5 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2,4-6 and 7 of U.S. Patent No. 6720034. Although the conflicting claims are not identical, they are not patentably distinct from each other because after the application of a ceramic barrier coating in

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claim 7 of the existing patent the component of the gas turbine engine inherently has an outer ceramic surface.

Claims 1-9 and 16-18 rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-16 of U.S. Patent No. 6720034 by Skoog et al. in view of US Patent 6342278 by Rigney et al. Claims 1-16 of U. S. Patent No. 6720034 teach all the limitations set forth by claims 1-9 and 16-18 of the present invention, except teaching of a component of a gas turbine engine having an outer ceramic surface. However, US Patent 6342278 by Rigney et al teaches of application of a protective ceramic coating to a superalloy turbine blade or a ceramic substrate. Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Skoog et al to deposit the heat reflective coating on an outer ceramic layer of a turbine blade suggested by Rigney et al with a reasonable expectation of success because Skoog teaches applying a thermal insulating coating to a superalloy turbine blade and Rigney teaches ceramic substrates benefit from an insulating coating. Such a modification to claims 1-16 of US Patent 6720034 would have been obvious to one of ordinary skill in the art and thus claims 1-9 and 16-18 of the present invention are obvious variants to claims 1-16 of US Patent 6720034.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al.

Nagaraj et al. teaches a method of applying a heat reflecting on a nickel-based superalloy component of a gas turbine engine by applying a ceramic thermal barrier coating onto the substrate by plasma spraying and then applying the heat reflecting layer of gold or platinum on the thermal barrier coating (Col. 3, line 26-Col. 4, line 24). It is the examiners position that the ceramic thermal barrier coating dries prior to application of the heat reflective coating. Nagaraj et al. does not teach the claimed method of applying the heat-reflecting layer. However, Nagaraj et al. teaches that the heat-reflecting layer can be applied by any conventional deposition technique (Col. 3, lines 49-57). Klabunde teaches forming a reflective metal layer, such as a gold or platinum layer, on a substrate by forming a dispersion of metal particles and organic solvent carrier, applying the dispersion to a substrate and then heating/firing to form the

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metal layer, where the dispersion can be applied by spraying (Col. 3, lines 35-65; Col. 6, lines 30-54).

Nagaraj et al. in view of Klabunde does not teach the spraying is an air assisted spraying technique. However, using air to atomize and project a spray for coating a gas turbine engines is well established in the art, as shown by Kirk-Othmer. (see page 672, Table 1, page 688, Table 2), and hence would have been an obvious method of spraying the heat-reflective coating because of the expectation of successfully forming the reflective layer.

It would have been obvious to one of ordinary skill at the time of the invention was made to apply the heat reflective layer of Nagaraj using conventional spraying as taught by Klabunde and specifically the conventional air-assisted spraying as disclosed by Kirk-Othmer because of the expectation of successfully applying the heat reflective layer on a gas turbine engine.

Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer do not teach the gas turbine engine having an outer ceramic layer. However, Nagaraj et al teaches a gas turbine engine part, while preferably formed from a nickel-based superalloy, can also be other suitable high temperature materials (Column 3, lines 29-31). Rigney et al teaching of a thermal barrier coating for a gas turbine engine discloses that deposition of a thermal barrier coating is advantageous to insulate a superalloy and/or ceramic substrate from high temperature.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer to use the ceramic substrate as suggested by Rigney et al to provide a desirable insulting coating because Rigney et al teaches both a superalloy and ceramic coating at known in the art to be subjected to high temperature environments.

Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. does not teach the claimed amount of reflective coating mixture and thermal barrier coating applied to the substrate. However, it is the examiners position that the amount of these coatings applied to the turbine component are known result effective variables, as not enough of these coatings applied to the component would not provide the desired heat reflectance and thermal barrier properties, and too much would not offer additional benefits of increased heat reflectance and thermal properties.

Therefore, it would have been obvious to one skilled in the art at the time of the invention was made to determine an optimal coating amount for the heat reflective layer and the thermal barrier layer, in the process of Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al., through routine experimentation, to provide the desired heat reflecting and thermal barrier properties for the turbine component.

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2. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. as applied to claim 6 above, and further in view of Vakil.

Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. does not teach the claimed thermal barrier layer material containing lanthanum or cerium. Vakil teaches a nickel-based superalloy gas turbine engine component having a ceramic thermal barrier coating, where the coating can include cerium (Col. 6, lines 1-25).

It would have been obvious to one skilled in the art at the time the invention was made to use the ceramic thermal barrier coating material of Vakil, including the cerium component, in the process of Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. with the expectation of providing suitable thermal barrier properties, as shown by Vakil for nickel-based superalloy gas turbine engine components.

3. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. as applied to claim 6 above, and further in view of Eppler.

Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. does not teach that the ceramic thermal barrier coating is applied by air assisted

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spraying. However, Eppler teaches breaking down a ceramic into fine particles and air assisted spraying them onto a substrate (Page 955, Column 3).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. to use the air assisted spray technique suggested by Eppler to provide a desirable ceramic coating on a substrate. Eppler teaches air-assisted spraying is known in the art to provide ceramic coatings onto a substrate.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. as applied to claims 1 above, and further in view of Tecle.

Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. does not teach of providing a reflective-coating mixture with a noble metal encapsulator. Tecle teaches of a method for forming a palladium, silver, gold or platinum in an organic carrier (Column 3, lines 25-35). Tecle discloses utilizing an encapsulant material to limit the required amount of solvent (Column 4, lines 59-67). Tecle utilizes a metallic colloidal solution with fluxing agents to coat ceramics, metals, and ceramic/metal composites (Column 7, lines 10-31).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. to use a solution containing a metal encapsulant and fluxing agent as

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taught by Tecle to provide a desirable metallic coating because Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. teaches using a metallic pigment in an organic solvent for coating a surface and Tecle teaches a metal encapsulant reduces the large amount of solvent required when coating a ceramic or metal substrate and fluxing agents are provide enhanced adherence of a coating to a substrate.

5. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. as applied to claims 1 above, and further in view of Akechi.

Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. does not teach a reflective coating mixture containing a glass or ceramic comprising up to 25 wt% of the reflective mixture. Akechi teaches of using glass frit and noble metal dispersion in an organic vehicle to form a coating (Abstract). In addition, Akechi clearly discloses including the filler material to provide passage for gas material at time of heating, so that the gas can easily pass through the passage to the surface (Page 4). Akechi goes on to say that film bulging and film tearing due to any residual gas can be completely prevented (Page 4). Akechi discloses using 1-3 wt % glass frit and 37-59 wt % noble metal powder in a 40-60 wt % organic vehicle (abstract). The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made if the overlapping portion of the range as disclosed by

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the reference were selected because overlapping ranges have been held to be prima facie case of obviousness. See *In re Wortheim* 191 USPQ 90.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. to use the glass frit/noble metal in an organic vehicle, with a reasonable expectation of success, as taught by Akechi to reap the benefits of providing a passage of gas for residual gases in the film to completely prevent film bulging and tearing upon heating.

6. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. as applied to claim 1 above, and further in view of US Patent 6210791 by Skoog et al.

Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. does not teach a firing temperature. Skoog et al. teaches of a gas turbine engine with a metal or a ceramic diffuse reflective barrier coating fired at a temperature between 800°F to 2500°F and more typically 1650°F (Column 10, lines 65-68).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. to use the firing temperature suggested by Skoog et al to provide a desirable firing of a reflective barrier coating because Nagaraj et al. in view of Klabunde

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and further in view of Kirk-Othmer and Rigney et al. teach of firing the barrier coating on a gas turbine engine part and Skoog et al. teaches of firing a barrier coating on a gas turbine engine is typically completed at 1650°F.

7. Claims 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer, Rigney et al., Eppler, Tecle, and Akechi as applied above, and further in view of Demaray.

Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer, Rigney et al., Eppler, Tecle, and Akechi teaches all the limitations of these claims as discussed above, except pre-treating the component surface prior to coating. Demaray teaches pretreating a component prior to application of a thermal barrier layer, in order to achieve a desired surface roughness (Col. 2, line 49-Col. 3, line 5). One skilled in the art would have recognized that such polishing/roughening is conventionally used for enhancing the adhesion of subsequently applied coatings to a substrate.

Therefore, it would have been obvious to one skilled in the art to pretreat the nickel-based superalloy component of Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer, Rigney et al., Eppler, Tecle, and Akechi, prior to applying the coatings, in order to enhance the bonding of the coatings to the metal components, since polishing of superalloys prior to coating to enhance coating adhesion is disclosed by Demaray.

(10) Response to Argument

The appellant has argued against the obvious type double patenting rejections over Skoog et al., stating the references fail to teach of supplying a component of a gas turbine engine having an outer ceramic surface and the references only teach of supplying a metallic component and then coating the metallic component with a ceramic. It remains the examiners position, while the component is supplied as metallic, after application of the ceramic coating, the component will have an outer ceramic surface, as required by the claim, and therefore a component with an outer ceramic surface is supplied.

The appellant has argued against the obvious type double patenting rejections over Skoog et al. in view of Rigney, stating the thermal barrier coating of Rigney can not be considered reflective coatings as specifically recited in the present invention, see page 9 appeal brief filed 10/24/2005. Therefore Rigney teaches away from the present invention. The examiner respectfully disagrees. Rigney et al clearly teaches of application of a protective insulating coating to a superalloy turbine blade or a ceramic substrate, and Skoog clearly deposits the heat reflective coating onto a superalloy turbine blade to provide insulation from heat. Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Skoog et al to deposit the heat reflective coating on an outer ceramic layer of a turbine blade suggested by Rigney et al with a reasonable expectation of success because Skoog teaches applying a

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thermal insulating coating to a superalloy turbine blade and Rigney teaches ceramic substrates benefit from an insulating coating.

The appellant has argued against the Nagaraj reference stating the present invention does not include a barrier coating, which is deposited by the techniques as disclosed at column 4, lines 15-16. The examiner notes the claim only requires the presence of the steps listed and does not limit the claim to exclude any other steps, which may include a thermal barrier coating as taught by Nagaraj or any other process steps.

The appellant has argued against the Klabunde reference stating that it does not teach the use of a palladium, platinum, and/or gold coating as a "reflective coating". Klabunde is utilized here to show a known method of applying a metal coating on a substrate includes forming a dispersion of metal particles and organic carrier, spraying the dispersion to the substrate, and finally heating/firing to form the metal layer (Col 3, lines 35-65; Col 6, lines 30-54).

The appellant argues against the Kirk-Othmer publication stating that the context of the Kirk-Othmer reference is directed toward internal workings of gas turbine engine and fails to teach heat-reflective coatings can be applied by spraying techniques. The examiner respectfully disagrees. The Kirk-Othmer publication, as a whole, is directed to known and conventional spraying techniques and discloses, on page 688 in Table 2, air-atomizing sprays is a known method of spraying coatings. Therefore, the Kirk-Othmer publication, reasonably suggests to one of ordinary skill in the art to utilize air-

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assisted spraying to coat a substrate. *Nagaraj discloses applying a noble metal coating onto a gas turbine substrate by any conventional method, Klabunde discloses applying a noble metal by using a dispersion of a noble metal and organic by spraying and Kirk-Othmer discloses air-assisted spraying is conventionally utilized in coating a substrate.*

Therefore, it would have been obvious to one of ordinary skill at the time of the invention was made to apply the heat reflective layer of Nagaraj using conventional spraying as taught by Klabunde and specifically the conventional air-assisted spraying as disclosed by Kirk-Othmer because of the expectation of successfully applying the heat reflective layer coating on substrate.

The appellant has argued against the Kirk-Othmer reference stating that it does not teach any method for coating the surface of a gas turbine engine. While the examiner agrees Kirk-Othmer does not explicitly state coating the surface of a gas turbine engine, *Nagaraj teaches coating, by a conventional method, a noble metal onto the surface of the gas turbine engine, Klabunde discloses noble metals are conventionally spraying onto surfaces to coat them, and Kirk-Othmer teaches conventional methods of coating substrates includes air-assisted spraying.* Therefore the examiner is not asserting that Kirk-Othmer directly teaches coating a gas turbine engine, only that they teach conventional spray coating methods and one of ordinary skill in the art would reasonably expect success spraying the metallic reflective layer of Nagaraj onto the gas turbine engine using the air assisted spray coating technique as taught by Kirk-Othmer.

The appellant has argued against the Rigney reference stating the reference does not teach a reflective coating and therefore is not properly combinable. Rigney is utilized here as a showing that ceramic gas turbine engines are known in the art to be subject to high temperature environments and Nagaraj discloses the reflective coating can be applied to any suitable high temperature material.

The appellant argues that the amount of reflective coating mixture and thermal barrier coatings applied to the substrate are not result effective variables. The examiner respectfully disagrees. Nagaraj discloses the heat reflective coating is applied in a sufficient amount as to yield an opaque coating with a micro-smooth finish so as to maximize the reflectivity of the coating (Column 3, lines 49-64). Therefore Nagaraj does disclose the amount of reflective coating is a result effective variable, easily optimized through experimentation to provide a coating with the desired reflectivity.

The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

The appellant has argued against the Tecle reference stating that it fails to disclose a method of applying a solvent including an encapsulant and fluxing agents. While the examiner agrees Tecle does not explicitly teach a method of application,

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Tecle reasonably suggests to one of ordinary skill in the art to provide a metallic particle/organic carrier solution with encapsulants to decrease the large amount of organic material required as well as fluxing agents to enhance the promotion of the coating to the substrate.

The appellant has argued against the Akechi reference stating that it teaches a thick paste and not therefore cannot be applied by the coating techniques of the present invention. The examiner only utilizes Akechi as a showing that it is known in the art to provide a glass filler in a noble metal/organic carrier dispersion. In response to appellant's argument that Akechi is nonanalogous art, it has been held that a prior art reference must either be in the field of appellant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the appellant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, both the prior art and the present claims are directed to applying a metal/organic coating onto a substrate. In addition, Akechi clearly discloses including the filler material to provide passage for gas material at time of heating, so that the gas can easily pass through the passage to the surface (Page 4). Akechi goes on to say that film bulging and film tearing due to any residual gas can be completely prevented (Page 4). In addition, Klabunde teaches a of applying a metal coating on a substrate includes forming a dispersion of metal particles and organic carrier, spraying the dispersion to the substrate, and finally heating/firing to form the metal layer (Col 3, lines 35-65; Col 6,

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lines 30-54). Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Nagaraj et al. in view of Klabunde and further in view of Kirk-Othmer and Rigney et al. to use the glass frit/noble metal in an organic vehicle taught by Akechi to reap the benefits of providing a passage of gas for residual gases in the film to completely prevent film bulging and tearing upon heating.

The appellant has argued against the Demaray reference stating that it teaches away from the present invention because it teaches different coatings as well as different methods of application. Demaray suggests, to one of ordinary skill in the art, to polish the substrate prior to coating achieves a desired surface roughness and one skilled in the art would recognize that this roughening enhances adhesion of the coating.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Respectfully Submitted,

David Turocy

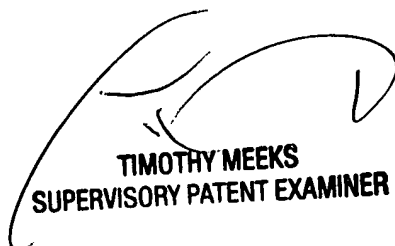
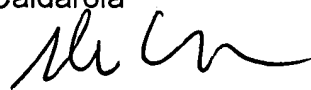
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Conferees:

Timothy Meeks

Glenn Caldarola



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER